Customer No.: 26308 *Patent*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: John Sinko Docket No.: 1406.17406-PROV FOR CIP

Serial No.: 10/784,541 Examiner: Lois L. Zheng

Filed: 23 February 2004 Group Art Unit: 1742

Title: Corrosion Inhibitor Composition Applicable for Aluminum and Steel Protection and Procedure

APPEAL BRIEF
TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

APPEAL BRIEF

This Appeal Brief is comprised of the following sections:

(i.) REAL PARTY IN INTEREST

The real party in interest in this case is the assignee, Wayne Pigment Corporation, a Wisconsin corporation, with a principal place of business at 300 S. Barclay St., Milwaukee, WI 53204.

(ii.) RELATED APPEALS AND INTERFERENCES

There are no related appeals and/or interferences of which the Applicant's attorney is aware at this time.

(iii.) STATUS OF CLAIMS

Claims 1-11, 13-16, and 27-36 remain in the application. Claims 1-11 are currently pending, and claims 13-16 and 27-36 are currently withdrawn. Claims 1-11 are presented as rejected in the Office Action of 3 September 2008.

(iv.) STATUS OF AMENDMENTS

There are no new amendments to the claims. The claims are presented as they were rejected in the Office Action of 3 September 2008.

(v.) SUMMARY OF CLAIMED SUBJECT MATTER

Currently there is one independent claim, claim 1. The invention of claim 1 is directed towards a process for protecting an aluminum substrate against corrosion. *See*, Page 3, line 37 – page 4, line 14. The process includes reacting an organic compound from a group consisting of di-mercapto and poly-mercapto derivatives and their derivatives, with a cationic species selected from a group consisting of Bi(III), Co(II), Cd(II), Ag(I), Sb(III), Ni(II), Li(I), La(III), and Pr(III) to form a pigment grade corrosion inhibiting composition. Page 6, lines 12-21. The composition has a limited solubility in water of between about 0.01 and about 1000 mmoles/ per liter of water. Page 9, lines 27-31. Further the corrosion inhibitor is capable of preventing corrosion for at least 2000 hours in salt spray exposure conditions. Example 17, Page 25, line 30 – page 28, line 9.

Protection of aluminum against atmospheric corrosion constitutes a challenge of significant economic importance. Among others, aluminum alloys containing a small percentage of Cu are well known and valued for their excellent mechanical properties, as, for example, Al 2024 T-3, widely applied in aircraft manufacturing industry.

$SrCrO_4$ is the corrosion inhibitor pigment of choice for aircraft and coil primers, and is the standard in the industry. Due to environmental concerns, finding a replacement for chromates in conversion coatings and organic coatings constitutes the objective of contemporary research in this field.

The present invention that organic compounds possessing cyclic structural features of aromatic character, carbocyclic and, specifically, heterocyclic aromatic structures containing one or multiple hetero species, such as, specifically, N, S, O atoms or combinations of the same, and preferably multiple –SH (mercapto) and = S, or thiol – thion functionalities attached, are effective inhibitors of corrosion of aluminum and its alloys. This discovery was not anticipated, considering that thiol-organic compounds (or/and H_2S) do not form essentially insoluble compounds (salts) with Al (III). As known, forming essentially insoluble (in water) compounds with ionic species of a specific metal is a general prerequisite for corrosion inhibitor activity of organic compounds on the respective metal substrate.

Specifically, the family of thio-organic compounds that includes di-mercapto and poly-mercapto compounds and their derivatives has been established as effective corrosion inhibiting products. More specifically, it has been discovered that 2,5-dimercapto-1,3,4 thiadiazole symbolized by $HS\text{-}CN_2SC\text{-}SH$ or "DMTD" and its derivatives inhibit atmospheric corrosion of aluminum, including Al 2024 T-3. It has been also proven that DMTD and various DMTD derivatives in pigment grade form are applicable as components of organic primers or in soluble or partially soluble form as an inhibitor constituent of conversion coating compositions intended for aluminum protection.

This discovery was unexpected, considering that DMTD does not form essentially insoluble compounds with Al(III), of which this characteristic is generally a prerequisite for corrosion inhibition activity of organic compounds on metal substrates.

Identification of "Means" Terms

There are no "Means" terms used in the currently pending claims.

(vi.) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following ground of rejection is presented for review, which is addressed in response to the Office Action of 22 August 2007:

I. Whether the Applicant has made a proper claim of priority.

II. Whether claims 1-11 are anticipated by Sinko, U.S. Pat. Appl. No. 2002/0197468.

III. Whether claims 1-4 and 6-11 are obvious over Sinko, U.S. Pat. 6,129,610 in view of King et al., U.S. Pat. No. 4,497,719.

IV. Whether claim 5 is obvious over Sinko, U.S. Pat. 6,129,610 in view of King et al., U.S. Pat. No. 4,497,719 and further in view of Ernhoffer et al., U.S. Pat. No. 5,171,861.

V. Whether claims 1-4 and 6-11 are obvious over Sinko, U.S. Pat. No. 6,129,610.

VI. Whether claim 5 is obvious over Sinko, U.S. Pat. No. 6,129,610 in view of Ernhoffer, et al., U.S. Pat. No. 5,171,861.

(vii.) ARGUMENT

Generally speaking, the rejections I-VI put forth are based on combining compounds recited in prior art, based on what the Applicant has disclosed and taught, and not what the prior art discloses or teaches. The cited prior art references either (A) do not recite the compounds and cations disclosed in the current application and/or (B) disclose compounds that are incompatible with the systems of the present application, and are incompatible with the other prior art references that they have been combined with for obvious arguments. The Examiner has used generalities in applying and combining the prior art to ignore what is being specifically claimed in the present invention, regardless that one having ordinary skill in the art would know and understand that the recited references are incompatible with one another.

The same chemical compound can be used in a wide range of systems, wherein usefulness of a chemical compound in one system does not necessarily correlate to usefulness in another system. Particularly, with respect to the DMTD compounds used in the present invention, the compounds have uses in various systems, such as in lubricants and greases, with such uses being counterproductive to the uses of the present invention. Multiple and distinct patents and patent applications of essentially the same chemical compound or compounds having differing subject matter scopes is abundant in the literature and legally is a well accepted practice of creating new intellectual property and invention. This implies that inventiveness in regards of manipulation of the physical properties of the

chemical compound in case (typically achieved by synthesis of diverse derivatives of the same compound) and also implies usefulness and or, novelty of the application intended.

In the particular case of DMTD, the prior art includes sulfonate reaction products (Ernhoffer), derivatives of former, which (in contrast with DMTD, a solid itself) are oil-like products, soluble in lubricants and consequently, applicable in lubricants. It will be noted however, that these sulfonate reaction products of DMTD (which are not volatile) are not applicable in organic paint and coatings: due to strict quality requirements related to paint stability and more importantly, due to the further requirements related to mechanical properties of resulted organic coatings, liquids compatible with paint formulations must be volatile (to leave the coating during the film formation). It will be evident that all the major constituents of organic coatings are solids, such as the resin component and the pigment components, inclusive the corrosion inhibitor pigments.

Consistent with the above, it is intuitive to expect that DMTD, as is, and some related compounds would be applicable as corrosion inhibitor in organic paints and coatings and more specifically in epoxy- or polyurethane–based aircraft primers.

This is not the case however, for DMTD and some related compounds displays reactivity for epoxy and polyurethane resins, resulting in uncontrollable curing of epoxy or poly-urethane paint formulations and precluding such application in practice; DMTD and some related compounds is not a "pigment grade" corrosion inhibitor. The present patent application discloses innovative solutions to this problem associated with the prior art. That is, derivatives of DMTD specified in the present patent application are compatible with epoxy- and polyurethane- based paint formulations, are characterized by limited and effective solubility and function as effective "pigment grade" corrosion inhibitors on Al in the resulted organic coatings.

I. Applicant Has Made a Proper Claim of Priority.

The Examiner has stated that the present invention discloses the cations Li(I), La(III) and Pr(III), which were not recited in the parent applications, U.S. Serial No. 10/138,794 or in the provisional application U.S. Serial No. 60/288,895. The present application is a continuation-in-part application to the cited applications, and the Applicant is allowed to claim priority to the cited applications. An alleged continuation-in-part

application should be permitted to claim the benefit of the filing date of an earlier nonprovisional application if the alleged continuation-in-part application complies with the other requirements of 35 U.S.C. 120 and 37 CFR 1.78, such as:

(A) The first application and the alleged continuation-in-part application were filed with at least one common inventor;

(B) The alleged continuation-in-part application was "filed before the patenting or abandonment of or termination of proceedings on the first application or an application similarly entitled to the benefit of the filing date of the first application"; and

(C) The alleged continuation-in-part application "contains or is amended to contain a specific reference to the earlier filed application."

As such, all that is required for a proper claim of priority is: A) A common inventor, B) filing of the CIP before termination of the first application, and C) language referring to the earlier filed application. The present application contains all three of these elements, and has properly claimed priority to the parent applications.

II. The Present Application is Not Anticipated by Sinko, U.S. Appl. No. 2002/0197468, Since Sinko, U.S. Appl. No. 2002/0197468 is Not a Proper Prior Art Reference.

Claims 1-11 were rejected under 35 U.S.C. § 102(b) as being anticipated by Sinko, U.S. Appl. No. 2002/0197468 (Sinko '468). As stated above, in section I, Sinko '468 is not a prior art reference, but rather an application that the Applicant properly claims direct priority from. The '468 application is U.S. Serial No. 10/138,794. It is not available as a prior art reference under 35 U.S.C. § 102(b), nor is it available as a prior art reference under any other section of 35 U.S.C. § 102 or 35 U.S.C. § 103, and removal of the rejection is respectfully requested.

It should be also pointed out that the Examiner's rejection of the claims over the '468 application directly contradicts the assertion put forth in section I that Sinko '468 does not support the current claims of the present application. That is, the Examiner stated that Sinko '468 does not support the claims as currently presented because it does not contain every claimed element (section I), but contains every element of the claims as currently presented to anticipate the claims (section II). The contradictory statements further provide

evidence that a proper claim of priority was made, and rejection of the present claims over the Applicant's own priority document is impermissible. Allowance of claims 1-11 is respectfully requested.

III. Claims 1-4 and 6-11 Are Not Obvious Over Sinko, U.S. Pat. No. 6,129,610 In View Of King et al., U.S Pat. No. 4,497,719.

Claims 1-4 and 6-11 were rejected over Sinko, U.S. Patent 6,129,610 (Sinko '610), in view of King et al., U.S. Pat. No. 4,497,719 (King). As Applicant has previously explained, Sinko '610 does not show or teach such a corrosion inhibitor that is pigment grade, as recited in claim 1, nor does it disclose the specifically claimed corrosion inhibitor, which is a corrosion inhibitor for organic coating applications that is capable of preventing corrosion of aluminum after a 2000 hour salt spray exposure test. Sinko does not show or teach such a corrosion inhibitor having such inhibitive properties, and the teachings of King are incompatible with corrosion inhibiting compositions applicable in organic coatings. The combination of Sinko with either King does not obviate claims 1-11 in the application.

The present invention is directed towards specific corrosion inhibiting compounds that are novel and useful in preventing corrosion as is required in real world situations. As understood in the art, a "pigment grade" quality implies: solid consistency, non-interference with paint stability, non-interference with curing mechanisms of resins in coating formation processes, limited but effective solubility in water and chemical affinity to interfere and effectively inhibit, in this particular case, the atmospheric corrosion of aluminum. As stated above, $SrCrO_4$ is the corrosion inhibitor pigment of choice for aircraft and coil primers, and is the standard in the industry, but there are environmental concerns associated with using $SrCrO_4$, which meets the criteria of usefulness for corrosion inhibitors within the aircraft industry, i.e. in organic coating applications on aluminum to at least a minimum of a 2000 hour salt spray exposure. Exhibits 2-5 demonstrate the efficacy of the present invention compared to the prior art strontium inhibitors, as well as other inhibitors used in the industry. In Exhibit 2, the DMTD inhibitor of the present invention is shown to provide significantly better corrosion inhibition after 3000 hours in a salt spray test compared to another inhibitor after <2000 hours of a salt spray test. Exhibits 3 and 4 show similar results of the present inhibitor after 2000 hours and 1000 hours, respectively, compared to a $SrCrO_4$ inhibitor, while exhibiting better results than other corrosion inhibitors in the industry.

Exhibit 5 shows the inhibitor of the present invention performing comparatively to the $SrCrO_4$ inhibitor. Thus, the present invention has addressed a long felt need or providing an effective corrosion inhibitor similar to that of the prior art that also addresses environmental concerns with the prior art.

Pertaining to the combination of the Sinko '610 and the King reference, "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art." MPEP § 2143.01(I)(*citing KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 416, 82 USPQ2d 1385, 1396 (2007)). That is, there must be more than the availability of two elements to say that they could be combined together to form the claimed invention. In the present invention and other inventions related to chemical compounds and chemical compositions, this means that more is required than the availability of individual compounds; there must be some reason or indication why they would be combined as suggested to arrive at the invention, other than the fact that the chemicals exist.

Sinko '610 describes corrosion inhibitors, but does not describe corrosion inhibitors that have the necessary qualities as recited in claim 1. As noted in the attached Declaration of the inventor, Dr. John Sinko, who is also the inventor of Sinko '610, Sinko '610 does not disclose corrosion inhibiting compounds that can meet the limitations of claim 1 directed specifically for aluminum. Exhibit 1, Sinko Declaration. While Sinko '610 does disclose corrosion inhibiting compounds that include DMTD and DMTD derivatives, the compounds were not utilized in real world situations, and specifically were not directed toward applications in organic coatings on aluminum. Further more, not every DMTD and DMTD derivative is of pigment grade applicable and useful in organic coating applications on Aluminum. Id. at ¶18. Sinko '610 does show various metal compounds of DMTD and derivatives, but it does not show the compounds recited in claim 1, i.e. pigment grade compositions, and the compounds of Sinko '610 do not meet the minimum values for corrosion protection as recited in claim 1. In fact, the understanding in the field of art at the time of invention would not have provided any suggestion or teaching in regards of the corrosion inhibitor mechanism of the present compositions, as the role of Cu-rich intermetallic inclusions in the corrosion mechanism of high strength aluminum was not understood.

King's disclosure is directed towards use of selected transition metal salts of one selected thiadiazole as high pressure and antiwear additives in lubrication systems, such as would be used in engine oils, lubricating greases and the like. King does not teach or show the use of the above mentioned metal salts for use in corrosion inhibition systems, and more specifically in organic coating applications intended for aluminum protection against corrosion. The disclosure is directed towards additives for greases and lubricants, and does not teach or suggest that such products could be incorporated into systems of the present invention.

One having ordinary skill in the art would understand that King has no application in corrosion inhibition and, in fact, is incompatible with compounds as disclosed in Sinko '610. The mere disclosure of metal anions in King does not correlate to an equivalent function as the invention of the present invention. One having ordinary skill in the art understands that the products of King, i.e. lubricants, would not be compatible with a corrosion inhibitor, similarly as to one would understand that it is not possible to mix oil and water. The fact that King discloses compounds having antiwear properties is irrelevant to the present invention and does not correlate to use in corrosion inhibitor; nothing in King or Sinko teaches or suggests how you would combine a lubricant into the recited corrosion inhibitor, and it is clear error to suggest that the combination obviates the present invention.

The Examiner has stated "[w]ith respect to the solubility as recited in claims 1 and 3, even though Sinko '610 in view of King do not explicitly teach the claimed water solubility, one of ordinary skill in the art at the time that the invention was made would have found the solubility of the coating composition obvious because the composition taught by Sinko '610 in view of King is substantially the same composition recited in the claims. Therefore, one or ordinary skill in the art would expect that the coating composition taught by the Sinko '610 in view of King would be substantially the same as the applicant's coating composition, including its solubility in water, see MPEP 2112.01. See, Office Action, 3 September 2008 at p. 5. This is erroneous statement for two main reasons.

First, there is no teaching in the prior art of combining Sinko '610 and King, and Sinko '610 and King are not a single composition. Therefore, there can be no "teaching" of the Sinko '610 and King composition, as it does not physically exist. It cannot exist, as King and Sinko '610 cannot be physically mixed with each other, according to the teachings of either of the individual references. The Examiner cites to a section of the MPEP where the

discussion is directed towards a single prior art reference that was silent to the specifically claimed characteristic. This is not the same as the present situation. There is no single compound that the Examiner has pointed to where the claimed characteristics may be within, but a composite structure suggested by the Examiner. As discussed above, not only is there no teaching that they could be combined, they are physically incompatible.

Second, the suggested individual compounds recited by the Examiner do not meet the required physical properties and cannot be modified as suggested. A statement that modifications of the prior art to meet the claimed invention would have been "'well within the ordinary skill of the art at the time the claimed invention was made"' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. MPEP § 2143.01(IV) (*citing Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993)). **King teaches and shows a compound that is insoluble in water.** It teaches directly away from what is being claimed. This directly contradicts the Examiner's statement that the modifications are obvious, as the Examiner has not relied on some objective reason to combine the teachings of the references. The fact that the chemicals exist is not an objective reason. As such, it is erroneous to suggest that two compounds, which are incompatible with one another, "teach" the recited claim elements.

The Examiner has also disregarded the Sinko declaration, i.e. the declaration of one having ordinary skill in the art, as insufficient to overcome the Examiner's arguments because the statements in the declaration were similar to the argument put for the in the response to the prior Office Action, See, Office Action at page 9. This is contrary to general practices. See, MPEP §2145. *In re Beattie*, 974 F.2d 1309, 1313, 24 USPQ2d 1040, 1042-43 (Fed. Cir. 1992) (Office personnel should consider declarations from those skilled in the art praising the claimed invention and opining that the art teaches away from the invention.). The declaration not only addresses the prior art as put forth by the Examiner, but also attests that the present invention addresses a long felt need in the industry. That is, the present invention provides a long-felt need in the industry by providing an organic inhibitor to replace chromate-based inhibitors that were the standard in the industry. The present corrosion inhibitors provide an effective level of protection similar to that of chromate-based compositions and also provide better protection than other corrosion

inhibitors, as demonstrated in Exhibits 2-5. Accordingly, the declaration of Sinko provides clear evidence to rebut the obvious rejection put forth by the Examiner.

The combination of Sinko '610 and King does not obviate claims 1-4 and 6-11. Neither Sinko '610 nor King is directed toward a pigment grade composition, as required by claim 1. Neither patent teaches or suggests how they could be combined with one another. King shows a compounds that is not soluble in water, which is directly opposite of what is being claimed. There is no evidence that the references should be or could be combined Removal of the rejection is respectfully requested.

IV. Claim 5 Is Not Obvious Over Sinko, U.S. Pat. 6,129,610 In View of King et al., U.S. Pat. No. 4,497,719 And Further In View Of Ernhoffer et al., U.S. Pat. No. 5,171,861.

Claim 5 was rejected over Sinko in view of King, and further view of Ernhoffer, et al., U.S. Pat. No. 5,171,861 (Ernhoffer). As discussed above with respect to the combination of Sinko and King, there has been no evidence to support the *prima facie* obviousness rejection. Similarly, there is no teaching or suggestion in Sinko '610 how such a non-compatible lubricant additive, as taught in either King or Ernhoffer, could be used in the system of Sinko '610, or how such an incompatible additive could be used in systems of the present application. As such, it would not be obvious to combine Sinko '610 with either King or Ernhoffer to arrive at the present invention, as there is no teaching or suggestion in either reference as to how they could be combined to arrive at the present invention. More particularly there is no teaching or suggestion from the cited patents on how to formulate corrosion inhibiting compounds suitable for organic coating applications and capable of preventing atmospheric corrosion on aluminum for 2000 hours in salt spray test Conditions.

Ernhoffer et. al, also discusses the use of thiadiazole derivatives for use in lubrication systems, such as would be used in engine oils, lubricating greases and the like. It will be noted that the disclosed thiadiazole derivatives in Ernhnoffer have liquid consistency, are soluble in non-polar solvents (i.e. grease) and are insoluble in water. Also, as stated above, " pigment grade" quality implies : solid consistency, non-interference with paint stability, non-interference with curing mechanisms of resins in coating formation processes, limited but effective solubility in water and chemical affinity to interfere and effectively inhibit, in this particular case, the atmospheric corrosion of aluminum.

Consequently, it is apparent that the thiadiazole derivatives according to Ernhoffer are not pigment grade and are not suitable for and useful in organic coating applications. Further, mercapto (-SH) functionality of the thiadiazole moiety of the aryl-sulfonate derivatives discussed in Ernhoffer is chemically blocked according to the reactions described in Ernhoffer. As the consequence, these derivatives lack the strong chemical affinity toward the Cu-rich intermetallic inclusions in high strength aluminum, which is the driving force of the spontaneous chemisorption and of the specific action mechanism of some thiadiazoles in inhibiting atmospheric corrosion of aluminum. That is, Ernhoffer teaches that the compounds described in its specification are not capable of being combined as suggested.

The Examiner previous stated that this was argument was not persuasive "because Erhnoff (sic) teaches silane gel coatings may contain thiadiazole derivatives. Therefore, one of ordinary skill in the art would have the thiadiazole derivative containing corrosion inhibiting composition of Sinko '610 to also be suitable for silane gel coatings." Office Action at page 9. There is no basis for this statement, particularly since Ernhoffer teaches a compound that is insoluble in water. Once again, the Examiner has made the argument that, since the compounds exist individually, it is obvious that they can be combined, regardless of whether they are physically incompatible and regardless that there is no teaching that they can be combined.

It is clear error to suggest that it is possible to combine the recited greases and lubricants of Ernhoffer and King with compositions recited in Sinko '610. They are physically incompatible, and the fact that each of the individual references is useful for their intended purposes does not mean that they can be simply combined, particularly when they are directed towards different uses. If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. See, MPEP § 2143.01(V) (*citing In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)). Contrary to what the Examiner suggests, the corrosion inhibitor compound of the present invention is not the same as the anti-wear compounds, i.e. lubricants, of King and Ernhoffer. Corrosion inhibiting compounds are products that are dried on the surface of an object. Lubricants are used in constantly moving parts, generally internal parts, where it is never desirous to allow the lubricant to dry. As such, the modifications to the compositions as suggested by the Examiner would render the prior art unsatisfactory for its intended purpose; there is no

suggestion or motivation to make the proposed modification. It is clear error to suggest that the Ernhoffer and King can be combined with Sinko '610 to obviate claim 5.

V. Claims 1-4 And 6-11 Are Not Obvious Over Sinko, U.S. Pat. No. 6,129,610.

The Examiner has stated claims 1-4 and 6-11 are obvious over Sinko, U.S. Pat. No. 6,129,610. As stated above, Sinko '610 does not show or teach such a corrosion inhibitor that is pigment grade, as recited in claim 1, nor does it disclose the specifically claimed corrosion inhibitor, which is a corrosion inhibitor for organic coating applications that is capable of preventing corrosion of aluminum after a 2000 hour salt spray exposure test. Sinko '610 does not show or teach such a corrosion inhibitor having such inhibitive properties. Such a teaching or suggestion comes directly from the present application, and such hindsight to suggest obviousness is improper.

As stated in the MPEP:

> The rationale to support a conclusion that the claim would have been obvious is that the substitution of one known element for another yields predictable results to one of ordinary skill in the art. If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art.

MPEP § 2143(A).

Furthermore, one having ordinary skill in the art understands that the interaction of chemicals and elements is not simply a matter of addition or subtraction, as suggested by the Examiner. The Examiner has stated it would have obvious to replace Zn with Cd, since they are in the same column of the periodic table. While this is a basic, textbook understanding of chemistry that columns of the periodic table generally have similar properties, one working directly with more complex chemicals and compounds, i.e. one having ordinary skill in the art, understands that substitution of one anion or cation for another would not necessarily lead to similar results, especially when dealing with transition metals. More so, the Examiner has made no suggestion why this alignment on the periodic table would obviate the entire group of cations recited in claim 1. Just as a dictionary does not "teach" a person how to put words together to form and conjugate complex sentences, the periodic table does not "teach" a person how to make and combine complex compounds.

Sinko '610 does not provide the requisite teachings of the claimed pigment grade corrosion inhibitor, nor does it provide or suggest the use of the cations recited in claim 1. There is no teaching or suggestion from the periodic table how to incorporate these cations into Sinko '610 to arrive at the required pigment grade inhibitor, and the suggestion that Sinko '610 obviates claims 1-4 and 6-11 is clear error.

VI. Claim 5 Is Not Obvious Over Sinko, U.S. Pat. No. 6,129,610 In View of Ernhoffer, et al., U.S. Pat. No. 5,171,861.

Claim 5 was rejected over Sinko '610 in view of Ernhoffer. The reasons presented above that Ernhoffer and King are incompatible Sinko '610 also hold true for Ernhoffer alone. Sinko '610 does not show or teach such a corrosion inhibitor that is pigment grade, as recited in claim 1, nor does it disclose the specifically claimed corrosion inhibitor, which is a corrosion inhibitor for organic coating applications that is capable of preventing corrosion of aluminum after a 2000 hour salt spray exposure test. Sinko '610 does not show or teach such a corrosion inhibitor having such inhibitive properties. Further reference to the periodic table, as suggested in Section (V), above, does not overcome these requisites claim 5.

There is no teaching or suggestion in Sinko '610 how such a non-compatible lubricant additive, as taught in Ernhoffer, could be used in the system of Sinko '610, or how such an incompatible additive could be used in systems of the present application. As such, it would not be obvious to combine Sinko '610 with Ernhoffer to arrive at the present invention, as there is no teaching or suggestion in either reference as to how they could be combined to arrive at the present invention. More particularly there is no teaching or suggestion from the cited patents on how to formulate corrosion inhibiting compounds suitable for organic coating applications and capable of preventing atmospheric corrosion on Aluminum for 2000 hours in salt spray test Conditions.

Ernhoffer et. al, also discusses the use of thiadiazole derivatives for use in lubrication systems, such as would be used in engine oils, lubricating greases and the like. There is no mention in Ernhoffer of incorporating into a gel. It will be noted that the disclosed thiadiazole derivatives have liquid consistency, are soluble in non-polar solvents (i.e. grease) and are insoluble in water. Also, as stated above, " pigment grade" quality implies: solid consistency, non-interference with paint stability, non-interference with curing

mechanisms of resins in coating formation processes, limited but effective solubility in water and chemical affinity to interfere and effectively inhibit, in this particular case, the atmospheric corrosion of aluminum.

Consequently, it is apparent that the thiadiazole derivatives according to Ernhoffer are not pigment grade and are not suitable for and useful in organic coating applications. Further, mercapto (-SH) functionality of the thiadiazole moiety of the aryl-sulfonate derivatives discussed in Ernhoffer is chemically blocked according to the reactions described in Ernhoffer. As the consequence, these derivatives lack the strong chemical affinity toward the Cu-rich intermetallic inclusions in high strength aluminum, which is the driving force of the spontaneous chemisorption and of the specific action mechanism of some thiadiazoles in inhibiting atmospheric corrosion of aluminum.

Just as Ernhoffer and King cannot be combined with Sinko '610, Ernhoffer alone cannot be combined with Sinko '610. To suggest otherwise is clear error. They are physically incompatible, and the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose. See, MPEP § 2143.01(V) Corrosion inhibitor compounds are not the same as the anti-wear compounds, i.e. lubricants, and the characteristics are not the same. Corrosion inhibiting compounds are products that are dried on the surface of an object. Lubricants are used in constantly moving parts, generally internal parts, where it is never desirous to allow the lubricant to dry. As such, the modifications to the compositions as suggested by the Examiner would render the prior art unsatisfactory for its intended purpose; there is no suggestion or motivation to make the proposed modification. Ernhoffer cannot be combined with Sinko '610 to obviate claim 5.

Conclusion

Claims 1-4 and 6-11 stand rejected. The Examiner has rejected the claims in various combinations over Sinko '610, King, and Ernhoffer. The references do not show or teach pigment grade compositions. These compounds have physical characteristics that are not compatible with one another and cannot be combined as suggested. King and Ernhoffer discuss grease-based products that provide no teaching or predictability for the currently presented claims. The mere fact that individual compounds do exist and that they are useful for their individual purposes does not provide evidence that they could be combined with one another or used for distinctly different purposes. The claimed invention of present

application provides a novel process for aluminum protection that has addressed a long felt needed in the industry. Removal of the rejections is respectfully requested.

(viii.) CLAIMS APPENDIX

Presentation of Claims as Currently Presented

1. (Previously presented) A process for protecting an aluminum substrate or a steel substrate against corrosion comprising:

providing an aluminum surface to be protected,

applying to said surface a protective composition comprising of a pigment grade corrosion inhibitor composition, said protective composition being formed by reacting an organic compound from a group consisting of di-mercapto and poly-mercapto derivatives and their derivatives, with a cationic species selected from a group consisting of Bi(III), Co(II), Cd(II), Ag(I), Sb(III), Ni(II), Li(I), La(III), and Pr(III), said protective corrosion inhibitor composition having a limited solubility in water of between about 0.01 and about 1000 mmoles/ per liter of water,

whereby said corrosion inhibitor is capable of preventing corrosion for at least 2000 hours in salt spray exposure conditions.

2. (original) A process according to claim 1 wherein said protective composition is applied as a layer of less than approximately 20 microns in thickness.

3. (original) A process according to claim 1 wherein said protective composition has a limited solubility in water of between about 0.1 and about 10 mmoles/ liter.

4. (original) A process according to claim 1 wherein said protective composition is applied as an aqueous solution and is subsequently dried whereby a conversion coating is formed on said substrate, said conversion coating being subsequently coated with a paint.

5. (original) A process according to claim 1 wherein said protective composition is incorporated into a silane-based gel coating.

6. (original) A process according to claim 1 wherein said protective corrosion inhibitor composition is selected from the group consisting of 2,5-dimercapto-1,3,4 thiadiazole or (DMTD), 2,4-dimercapto-s-triazolo-[4,3-b]-1,3-4-thiadiazole, trithiocyanuric acid or (TMT), derivatives of DMTD, and derivatives of TMT, dithiocyanuric acid, dimercaptopyridine, 2,4-dithiohydantoine, and 2,4-dimercapto-6-amino-5-triazine.

7. (Previously presented) A process according to claim 1 wherein said protective composition is selected from the group consisting of $M(DMTD)_n$ where n = 1,2 or 3, and M is a metal cation selected from the group consisting of Bi, Co, Ni, Cd, Ag, Sb, Li, La, Pr; alkyl ammonium salts of DMTD and $(DMTD)_n$; cyclo-alkyl ammonium salts of DMTD and $(DMTD)_n$; di-cyclo alkyl ammonium salts of DMTD and $(DMTD)_n$; aryl ammonium salts of DMTD; aryl ammonium salts of $(DMTD)_n$; quaternary ammonium salts of DMTD; quaternary ammonium salts of $(DMTD)_n$; polyaniline, polythiophen, and polypyrrol doped with DMTD; polyaniline, polythiophen, and polypyrrol doped with $(DMTD)_2$; and micro and nano composites of poly DMTD/polyaniline, DMTD/polythiophen and poly DMTD/polypyrrol.

8. (original) A process according to claim 1 wherein said protective composition is applied by incorporating the same in a curable polymeric coating composition and applying said composition over said substrate.

9. (Previously presented) A process according to claim 1 wherein said protective composition is selected from the group consisting of: N- or S- and N-, N-, S- and N-, S- substituted derivatives of DMTD such as 5-mercapto-3-phenyl-1,3,4-thiadiazoline–2-thione (Bismuthiol II), substituted derivatives of 5,5' dithio-bis(1,3,4 thiadiazole-2(3H)-thione $(DMTD)_2$, substituted derivatives of 5,5'-Thiobis (1,3,4-thiadiazole-2(3H)-thione substituted derivatives of dimercaptopyridine, and of 2,4-dithiohydantoine, substituted derivatives of 2,4-dimercapto-6-amino-5-triazine and $(DMTD)_n$, a polymer of DMTD; a salt of DMTD of general formula, $M(DMTD)_n$, where n = 1,2 or 3, and M is a metal cation and M = Bi, Co, Ni, Cd, Ag, Sb, Li, La, Pr; a salt of $(DMTD)_n$ of general formula $M[(DMTD)_n]_m$, where n=2 or n>2, m=1,2, or 3 and M = Bi, Co, Ni, Cd, Ag, Sb, Li, La, Pr; alkyl ammonium salts of DMTD and $(DMTD)_n$; cyclo-alkyl ammonium salts of DMTD and $(DMTD)_n$; di-cyclo alkyl ammonium salts of DMTD and $(DMTD)_n$; aryl ammonium salts of DMTD and $(DMTD)_n$; quaternary ammonium salts of DMTD and$(DMTD)_n$; polyammonium salts of DMTD and $(DMTD)_n$ formed with a polyamine; polyaniline, polypyrrole and polythiophen doped with DMTD; polyaniline, polypyrrole and polythiophen doped with $(DMTD)_2$; micro and nano composites of poly DMTD/polyaniline, poly DMTD/polypyrrole, and poly DMTD/polythiophen; DMTD, salts of DMTD, and derivatives of DMTD, as constituents of an inorganic matrix;. and a combination of said forms.

10. (Previously presented) A process according to claim 1 wherein said protective composition is selected from the group consisting of:

S-substituted derivatives of trithiocyanuric acid (TMT); a salt of TMT of general formula, $M(TMT)_n$, where n = 1,2 or 3, and M is a metal cation and M = Bi, Co, Ni, Cd, Ag, Sb, Li, La, alkyl ammonium salts of TMT; cyclo-alkyl ammonium salts of TMT; dicyclo alkyl ammonium salts of TMT; aryl ammonium salts of TMT; quaternary ammonium salts of TMT; polyamines formed with TMT; polyaniline doped with TMT; polypyrrole and polythiophen doped with TMT; micro and nano composites of poly TMT/polyaniline, poly TMT/ polypyrrole, and poly TMT/polythiophen; TMT, salts of TMT; and derivatives of TMT, as constituents of an inorganic matrix; salts of TMT and derivatives of TMT in encapsulated form in a polymer matrix, or as a cyclodextrin-inclusion compound; and a combination of said forms.

11. (original) The protective composition of claim 1 wherein the protective composition is used in a paint.

12. (cancelled)

13. (withdrawn) A method for producing a protective corrosion inhibitor composition, the method comprising:

incorporating an organic compound selected from the group consisting of DMTD, TMT, derivatives of DMTD, and derivatives of TMT, with an inorganic compound selected from the group consisting of phosphates, molybdates, borates, silicates, tungstates, phoshotungstates, phosphomolybdates, cyanamides, carbonates, SiO_2 and mixtures thereof.

14. (withdrawn) The method according to claim 13, wherein said inorganic compound consists of a Ce-molybdate, La-molybdate, Zn-molybdate, or a mixture thereof.

15. (withdrawn) An atmospheric corrosion inhibitor for a steel substrate, said corrosion inhibitor formed by:

reacting an organic compound from a group consisting of di-mercapto and poly-mercapto derivatives and their derivatives, with an ionic species from a group consisting of Bi(III), Co(II), Cd(II), Pb(II), Ag(I), Sb(III), Cu(II), Ni(II), Li(I), La(III), Al(III)), and Pr(III).

16. (withdrawn) An atmospheric corrosion inhibitor for aluminum, said corrosion inhibitor formed by:

reacting an organic compound from a group consisting of TMT and TMT derivatives, with species of Bi(III), Co(II), Cd(II), Pb(II), Ag(I), Sb(III), Cu(II), Ni(II), Li(I), La(III), Al(III), and Pr(III).

17- 26. (cancelled)

27. (withdrawn) An atmospheric corrosion inhibitor for a steel substrate, said corrosion inhibitor formed by:

reacting an organic compound from a group consisting of di-mercapto and poly-mercapto derivatives and their derivatives, with an ionic species from a group consisting of Zn(II), Fe(II), Ca(II), Sr(II), Mg(II), Ce(III), Al(III), and Zr(IV).

28. (withdrawn) An atmospheric corrosion inhibitor for aluminum, said corrosion inhibitor formed by:

reacting an organic compound from a group consisting of TMT and TMT derivatives, with species of Zn(II), Fe(II), Ca(II), Sr(II), Mg(II), Ce(III), Al(III), and Zr(IV).

29. (withdrawn) A method of synthesizing a conductive polymer dope with thio-organic compounds with acidic character, such as DMTD, the method including the steps of:

providing a conductive polymer selected from the group consisting of polyaniline, polypyrrole, and polythiophen, and combinations thereof;

providing a thio-organic compound of acidic character selected from a group consisting of di-mercapto and poly-mercapto compounds and their derivatives;

adding said conductive polymer into a first aqueous solution;

deprotonating said conductive polymer in said first aqueous solution; and

reprotonating in a second aqueous solution said deprotonated polymer in the presence of said thio-organic compound of acidic character.

30. (withdrawn) The method according to claim 29 wherein said thio-organic compound is selected from the group consisting of:

2,5-dimercapto-1,3,4 thiadiazole (DMTD), 2,4-dimercapto-s-triazolo-[4,3-b]-1,3-4-thiadiazole, N- or S- and N-, N-, S- and N-, S- substituted derivatives of DMTD such as 5-mercapto-3-phenyl-1,3,4-thiadiazoline –2-thione (Bismuthiol II) and 5,5' dithio-bis(1,3,4 thiadiazole-2(3H)-thione $(DMTD)_2$, and 5,5'-Thiobis(1,3,4-thiadiazole-2(3H)-thione and dimercaptopyridine, and 2,4-dithiohydantoine, and 2,4-dimercapto-6-amino-5-triazine and $(DMTD)_n$, a polymer of DMTD and trithiocyanuric acid TMT.

31. (withdrawn) A method of synthesizing a conductive polymer doped with thio-organic compounds with acidic character, such as DMTD, the method including the steps of:

providing a conductive polymer selected from the group consisting of, polyaniline, polypyrrole, and polythiophen and combinations thereof;

providing an thio-organic compound selected from a group consisting of di-mercapto and poly-mercapto compounds with acidic character and their the derivatives;

providing a first aqueous solution containing a base;

adding said conductive polymer to said first aqueous solution;

forming a base polymeric compound from said conductive polymer in said first aqueous solution;

providing a second aqueous solution containing a thio-organic compound with acidic character;

adding said base polymer compound to said second aqueous solution; and

stirring said thio-organic compound with acidic character and said base polymer compound in said second aqueous solution to form said conductive polymer by re-protonation.

32. (withdrawn) The method according to claim 31 further including the step of:

adjusting the pH of said first aqueous solution by adding a base.

33. (withdrawn) The method according to claim 32 wherein said pH being adjusted to between 9 and 10.

34. (withdrawn) The method according to claim 31 wherein said second aqueous solution is heated to between 30°C and 95°C during re-protonation.

35. (withdrawn) The method according to claim 31 wherein said second aqueous solution contains ethanol from 3% to 50%.

36. (withdrawn) The method according to claim 31 wherein said thio-organic acid compound is selected from the group consisting of:

2,5-dimercapto-1,3,4 thiadiazole (DMTD), 2,4-dimercapto-s-triazolo-[4,3-b]-1,3-4-thiadiazole, N- or S- and N-, N-, S- and N-, S- substituted derivatives of DMTD such as 5-mercapto-3-phenyl-1,3,4-thiadiazoline –2-thione (Bismuthiol II), substituted derivatives of 5,5' dithio-bis(1,3,4 thiadiazole-2(3H)-thione $(DMTD)_2$, substituted derivatives of 5,5'-

Thiobis(1,3,4-thiadiazole-2(3H)-thione and dimercaptopyridine, substituted derivatives of 2,4-dithiohydantoine, substituted derivatives of 2,4-dimercapto-6-amino-5-triazine and $(DMTD)_n$, a polymer of DMTD and trithiocyanuric acid TMT.

(ix.) EVIDENCE APPENDIX

Sinko – U.S. Pat. No. 6,129,610

King – U.S. Pat. No. 4,497,719

Ernhoffer et al. – U.S. Pat. No. 5,171,861

(x.) RELATED PROCEEDINGS APPENDIX

(NONE)

Respectfully Submitted,

By: _____
Patrick J. Fleis, Reg. No. 55,185

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Enclosures: Transmittal of Appeal Brief
Five (5) Exhibits
Check
Return Postcard

DECLARATION OF JOHN SINKO
UNDER 37 C.F.R. § 1.132

I, John Sinko, do declare that:

1. I am the inventor of the current application, U.S. Pat. Appl. Serial No. 10/784,541, titled "Corrosion Inhibitor Composition Applicable for Aluminum Protection and Procedure;
2. I am also the inventor of U.S. Pat. No. 6,129,610, entitled "Hybrid Pigment Grade Corrosion Inhibitor Compositions And Procedures" (the 'Sinko '610 patent);
3. I have a Doctorate degree in Chemistry;
4. I am a member of the American Chemical Society, the Electrochemical Society and NACE International;
5. For over the past twenty years, I have been the Technical Director and Director of the research and development program at Wayne Pigment Corp., Milwaukee, Wisconsin, which is the assignee of both the current application and the Sinko '610 patent;
6. My research interest has been focused on the chemistry and technology of stain inhibitor additives and pigments, as well as on research and development of corrosion inhibitor pigments;
7. I have authored or co-authored more than 30 U.S. and international patents in chemistry and the chemical fields;
8. I have authored or co-authored at least twenty-two scientific papers and have contributed to more than twenty-five communications/lectures at international scientific conferences and seminars;
9. Several of the patents, publications, and communications I have authored relate to theoretical aspects of corrosion inhibition in organic coatings and specifically to application of DMTD and DMTD derivatives in enhancement of corrosion inhibition on aluminum;
10. Protection of aluminum is important, with certain industries placing great importance on the protection of aluminum against atmospheric corrosion;
11. For example, due to air-safety and performance concerns, aluminum protection against atmospheric corrosion in the airplane industry, the protection of airplane hulls, is of paramount importance;
12. The corrosion inhibitor pigments of choice used (which are essentially exclusively used) in organic coatings intended for aircraft protection against atmospheric corrosion are chromate based pigments;
13. However, chromate corrosion inhibitor pigments present considerable environmental hazards and human toxicity concerns; for the past two decades, significant efforts have been invested, both by governmental related agencies and private enterprises, into R&D aimed toward replacement of chromate inhibitor pigments with environmentally friendly compounds intended specifically for applications in aircraft coatings;
14. Due to safety and performance issues, there is no room for compromise and replacement corrosion inhibitor compositions must be as effective as the chromates currently used in aircraft protection against atmospheric corrosion;

15. For example, corrosion inhibitor pigments applicable for aircraft protection against atmospheric corrosion must, in typical organic coating applications, effectively prevent corrosion of high strength Aluminum for at least 2000 hours in salt spray test conditions. Notable, this is the requirement which qualifies the criteria of usefulness for novel corrosion inhibitor pigments intended for aircraft coating applications.

16. Consequently, as is well known in the industry, none of the non-chromate corrosion inhibitors based on traditional inorganic chemistry are capable of meeting the requirements that are necessary to be considered as useful replacement corrosion inhibitor for chromates;

17. The inventions of the US patent '610 by Sinko are related to providing novel corrosion inhibitor compositions applicable in organic coatings, intended, in general for protection of metal substrates, such as in mirror backing coatings and the like;

18. While the recited compounds were effective corrosion inhibitors, the teachings of '610 patent by Sinko were not useful in regards of, or directed toward applications in organic coatings intended specifically for Aluminum protection against atmospheric corrosion; in this regards, the criteria of usefulness is specified above.

19. I have also reviewed and am familiar with the prior art cited by the Examiner, King et al., U.S. 4,497,719 (King) and Ernhoffer, et al., U.S. Pat. No. 5,171,861 (Ernhoffer);

20. The disclosures of both patents, by King and Ernhoffer, are directed towards applications in lubricant greases, which are, evidently, not similar to organic coatings intended for metal protection against atmospheric corrosion;

21. Further, the teaching of King's and specifically of Ernhoffer's are not relevant to corrosion inhibitor compositions of pigment grade quality which are intended for applications in organic coatings;

22. It will be noted that "pigment grade" quality implies: solid consistency, non-interference with paint stability and with curing mechanisms of resins in coating formation processes, no adverse effect on mechanical properties of resulted organic coatings and finally, it implies limited but effective solubility in water. It will be also noted that useful inhibitor pigments must be capable of releasing ionic inhibitor species (into aqueous environments) with strong chemical affinity to interfere and effectively inhibit, in this particular case, the atmospheric corrosion of Aluminum (in a typical organic coating application) for at least 2000 hours in salt spray test conditions.

23. None of the disclosures or teachings by King, Ernhoffer, and Sinko '610 are relevant in providing any suggestion in regards of corrosion inhibitor compositions applicable and useful in organic coatings intended for Aluminum protection against atmospheric corrosion.

24. For example, it will be noted that the compounds disclosed by Ernhoffer are of liquid consistency, soluble in non-polar greases and not soluble in water; it will be apparent that such compounds are not of pigment grade quality and consequently, are not suitable for applications in organic coatings. Further, considering that the compounds according to Ernhoffer can not release active inhibitor species into aqueous phases, these can not be useful inhibitors of atmospheric corrosion of Aluminum.

25. Similarly, King, which teaches compounds applicable as high pressure and anti-wear lubricant additives, does not show or teach how the disclosed compounds could be applied in organic coatings as corrosion inhibitor pigments and specifically, to be useful in Aluminum protection against atmospheric corrosion;

26. Accordingly, it would not be obvious to combine the disclosures of the '610 Sinko patent with either Ernhoffer's or King's, as they are non-analogous arts that do not provide the necessary teaching to arrive at the presently claimed invention;

27. I declare further that all statements made in this Declaration are based of my own knowledge and are true and that all statements made on information and belief are believed to be true and further that theses statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of any patents issuing from U.S. Pat. Appl. Serial No. 10/784,541 and any further reissue patents issuing therefrom.

By: _____ Date: July 9, 2008

Dr. John Sinko
Wayne Pigment Corporation

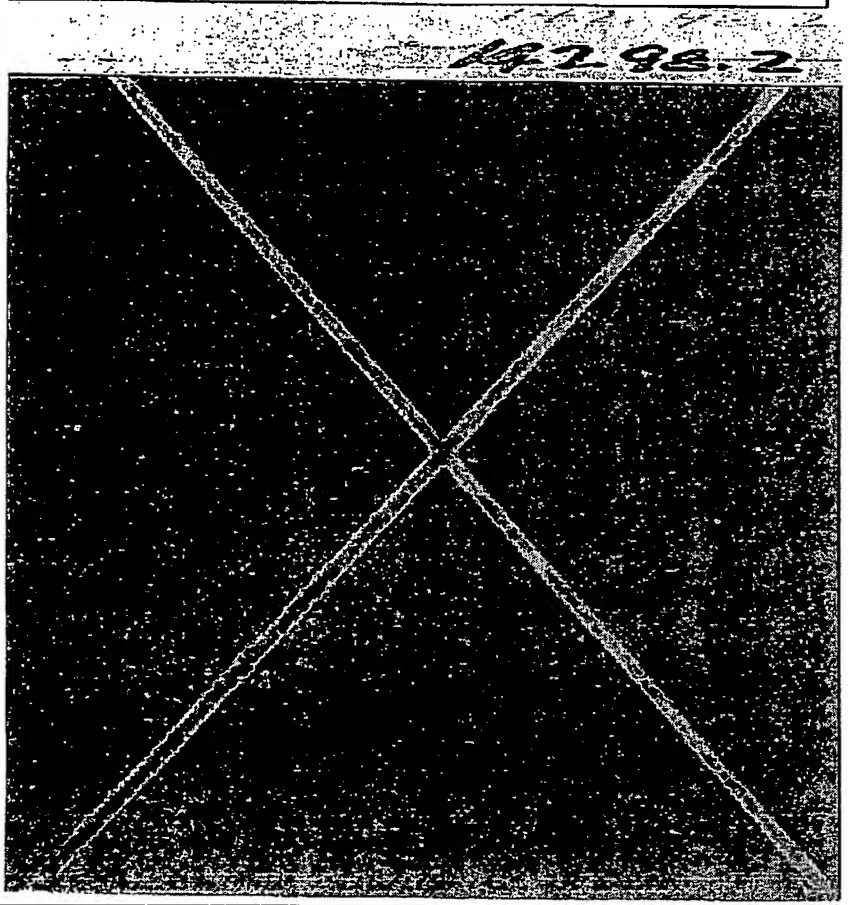
Wayne Pigment Corp

A-2024

Inhibitor Pigment: DMTD Derivative

After 3000 hrs Salt Spray

Exposure ASTM – B-117



A-2024

Inhibitor Pigment: $CeMoO_4$

After < 2000 hrs Salt Spray

Exposure ASTM – B-117

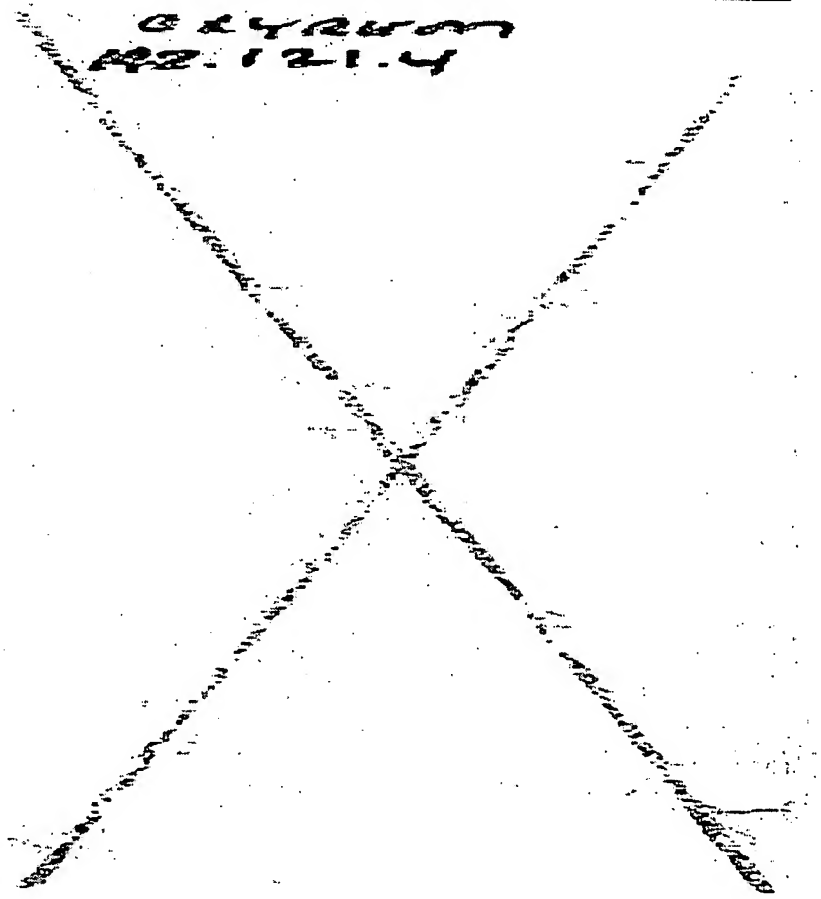
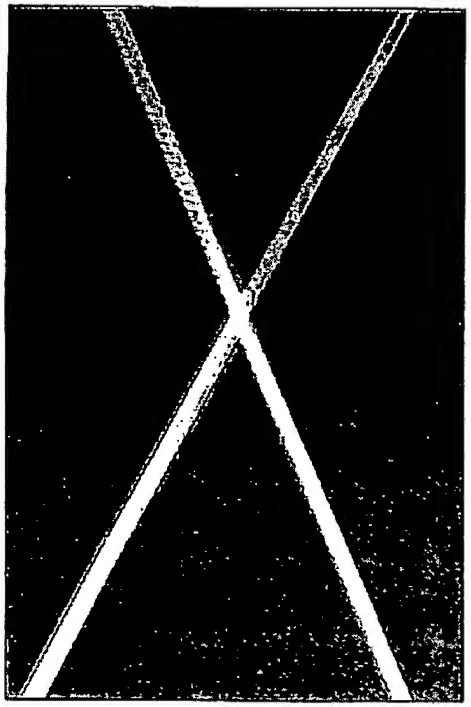


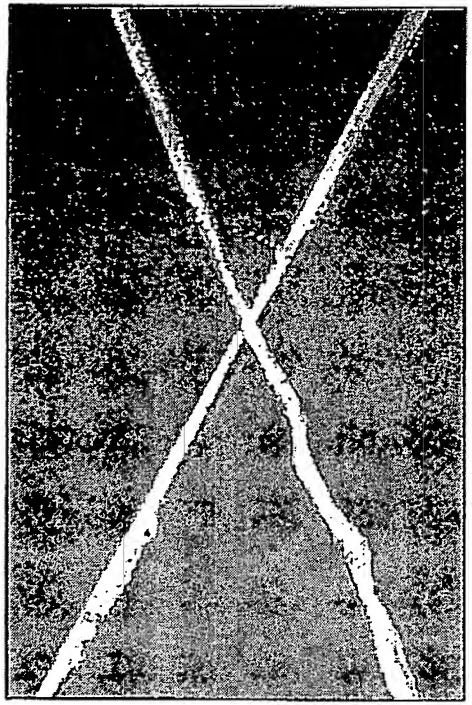
EXHIBIT 2

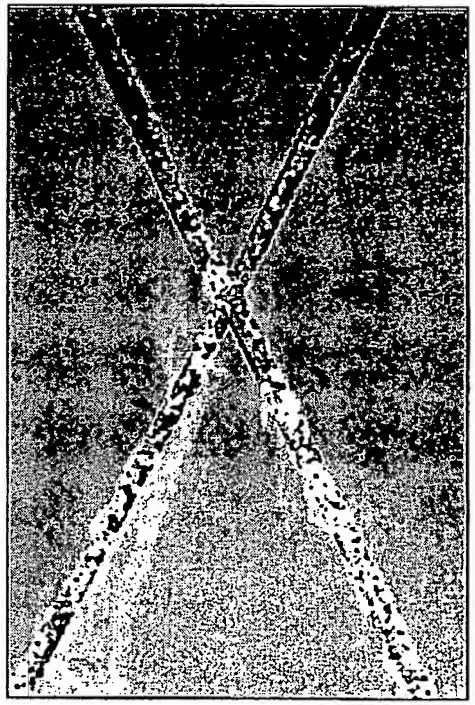
Wayne Pigment Corp

HYBRID INHIBITOR PIGMENTS PROMISING ALTERNATIVES TO CHROMATES ON Al

C.I.P.: $SrCrO_4$ DMTD Derivative MoO_4^{2-} based







Salt Spray Resistance (ASTM B-117) :
Substrate: Bare 2024T3 Aluminum, Alodine 1200 treatment
Primer: Two component epoxy conforming to Mil-P-23377G
Exposure: **2000** hours, **scribe width ~ 2 mm** (2000 microns)

From: Sinko, 2001

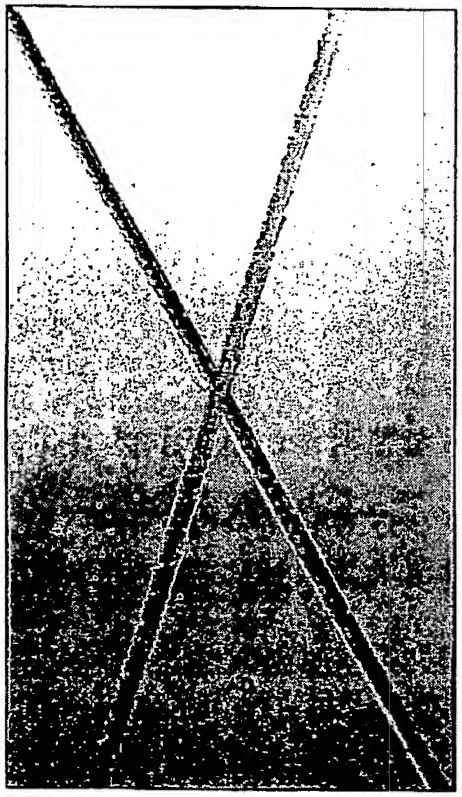
EXHIBIT 3

Wayne Pigment Corp

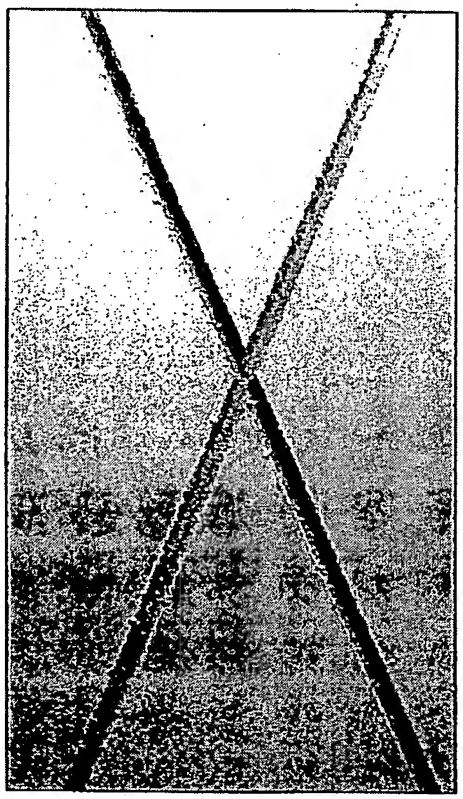
Filiform Corrosion Resistance:
ASTM D-2803B, modified

Substrate: Al Clad 2024T3, Alodine 1200 treatment
Primer: Two component epoxy conforming to Mil-P-23377G
Topcoat: Two component urethane
Exposure: 1000 hours

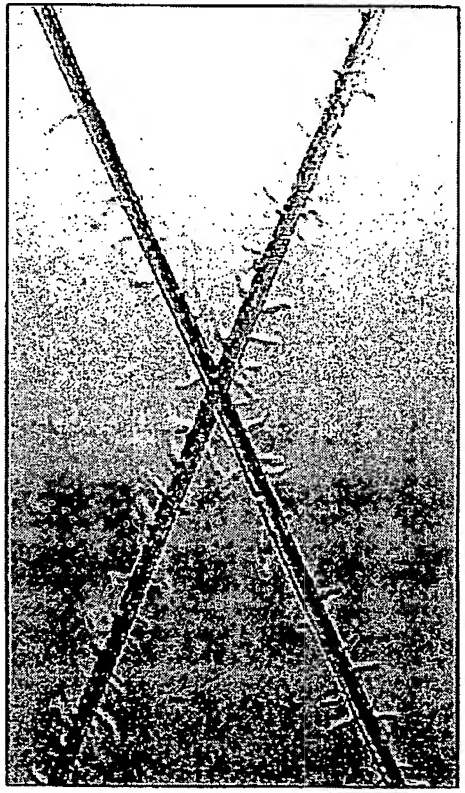
$SrCrO_4$



DMTD Derivative



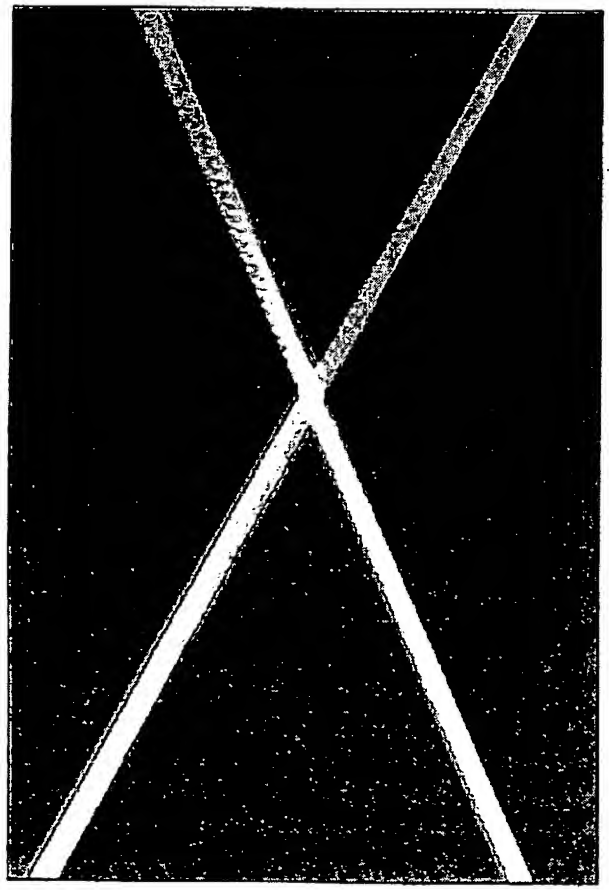
PO_4^{3-} based



From: Sinko, 2001

EXHIBIT 4

Wayne Pigment Corp



Strontium Chromate Inhibitor Pigment in Epoxy Primer Coating on Al-2024 After 2000 h. Salt Spray Exposure

Corrosion Inhibitor Poly-Aniline Doped with DMTD + Poly-DMTD in Poly-Urethane Coating on Al-2024 after 2000 h. Salt Spray Exposure

EXHIBIT 5